Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Office of Engineering and Technology	)	GN Docket No. 19-128
and Wireless Telecommunications Bureau	)	
Seek Comment Pursuant to Ray Baum's	)	
Act of 2018	)	

REPLY COMMENTS OF OCEUS NETWORKS, INC.

Oceus Networks, Inc. (Oceus Networks) submits these reply comments concerning the Federal Communications Commission's (the Commission) Public Notice in which the Office of Engineering and Technology (OET) and the Wireless Telecommunications Bureau (WTB) seek comment on bidirectional sharing pursuant to the RAY BAUM'S Act of 2018.[1]

I. Introduction

Oceus Networks is encouraged by the growing support for bidirectional sharing as an innovative and much needed addition to the spectrum sharing toolkit.[2] Bidirectional sharing is a necessary prerequisite to enabling Federal adoption and implementation of advanced commercial technologies, especially for critical applications that enhance U.S. warfighter effectiveness and protect national security.[3] The importance of bidirectional sharing is recognized in comments

[1] *Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Comment on Bidirectional Sharing Pursuant to Ray Baum's Act Of 2018*, Public Notice, GN 19-128, (rel. May 1, 2019) [hereinafter *Bidirectional Sharing Public Notice*].

[2] A record of growing support prior to this proceeding is provided in Oceus Networks' previous comments in this proceeding. Oceus Networks, Inc., Comments Before the Federal Communications Commission, Docket. No. 19-128 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/1053155951606/Oceus%20Networks%20GN%2019-128%20Comments%20FINAL.pdf.

[3] A more detailed analysis and explanation of how this is accomplished is provided in Oceus Networks' previous comments in this proceeding. *Id.*

from The Boeing Company (Boeing),[4] Federated Wireless, Inc. (Federated Wireless),[5] and the Telecommunications Industry Association (TIA).[6]

In order for all Federal and non-Federal users to have sufficient access to spectrum to meet their needs, the U.S. must move away from the de facto spectrum exclusivity policy regime and embrace innovative spectrum sharing solutions such as bidirectional sharing. Spectrum is a finite resource in rapidly increasing demand. As has been explained by many stakeholders, sharing is required to maximize efficiency and ensure all users have adequate spectrum access. Federal access to non-Federal bands, otherwise known as bidirectional sharing, is a critical type of sharing as it enables Federal adaption of commercial technologies, thus enhancing the U.S. warfighter and protecting national security. For this to be effective, Federal access must be flexible and come with adequate regulatory certainty.

Oceus Networks urges the Commission to answer Congress' specific request in the RAY BAUM'S Act to submit a report on a study, conducted by the Commission in collaboration with the National Telecommunications and Information Administration (NTIA), "to *determine the best means* of providing Federal entities flexible access to non-Federal spectrum on a shared basis across a range of short-, mid-, and long-range timeframes, including for intermittent

[4] Boeing, Comments Before the Federal Communications Commission, Docket. No. 19-128, at 3 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/10531805213083/Boeing%20bidirectional%20sharing%20comments.pdf.
[5] Federated Wireless, Inc., Comments Before the Federal Communications Commission, Docket. No. 19-128, at 2 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/10531101030324/Federated%20Wireless%20Comments%20on%20Bidirectional%20Sharing%20-%20FINAL%205.31.2019.pdf.
[6] TIA, Comments Before the Federal Communications Commission, Docket No. 19-128 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/10531150809824/TIA%20Comments%20on%20Bidirectional%20Sharing%205-31-2019.pdf.

purposes like emergency use."[7] Boeing,[8] CTIA,[9] Federated Wireless,[10] T-Mobile USA, Inc. (T-Mobile),[11] and Verizon[12] also highlighted this request. In the five years since action on this issue was last deferred, the need for a workable bidirectional sharing framework has only increased.[13] After building a record on this issue in this proceeding, the Commission should now rapidly move forward on implementing this sharing paradigm.

II. United States Spectrum Management Policy Must Encourage and Incorporate Many Forms of Sharing, Including a Robust Bidirectional Sharing Framework to Protect National Security.

A. The Culture of Spectrum Management Must Change from Exclusivity to Collaboration for a Successful National Spectrum Strategy.

The Commission, the President, and Congress have already recognized the fact that exclusive licenses cannot be the sole pillar upon which the nation's spectrum framework rests. [14]

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[7] Consolidated Appropriations Act of 2018, Pub. L. No. 115-141, Division P, Repack Airwaves Yielding Better Access for Users of Modern Services Act of 2018, Pub. L. 115-141, § 610, 132 Stat. 1080, 1108 (2018) [hereinafter RAY BAUM'S Act]. In contrast OET and WTB's Public Notice finds that Congress "requires the Commission, in collaboration with NTIA, to submit a report that *examines aspects* of providing Federal entities flexible access to non-Federal spectrum on a shared basis[.]" *Bidirectional Sharing Public Notice*, *supra* note 1, at 1.

[8] Boeing, *supra* note 4, at 3.

[9] CTIA, Comments Before the Federal Communications Commission, Docket. No. 19-128, at 1 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/105310200324231/190531%20CTIA%20Comments%20on%20Bidirectional%20Sharing%20Public%20Notice.pdf.

[10] Federated Wireless, Inc., *supra* note 5, at 2.

[11] T-Mobile, Comments Before the Federal Communications Commission, Docket. No. 19-128, at 1 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/1053152587735/T-Mobile%20Bidirectional%20Sharing%20Comments%20(As-Filed)%205.31.19.pdf.

[12] Verizon, Comments Before the Federal Communications Commission, Docket. No. 19-128, at 5 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/1053153317865/053119%20Bidirectional%20Sharing%20PN%20Comments%20(FINAL)-c.pdf.

[13] *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, Report and Order, 29 FCC Rcd 4610 at ¶ 202 (2014) [hereinafter "AWS-3 Order"].

[14] FCC has implemented sharing in 5G spectrum including the 3.5 GHz, 37 GHz, and 1675-1680 MHz bands. Shiva Stella, *Public Knowledge Welcomes FCC Proposal for Spectrum Sharing in 1675-1680 MHz Band*, Public Knowledge (May 9, 2019), https://www.publicknowledge.org/press-release/public-knowledge-welcomes-fcc-proposal-for-spectrum-sharing-in-1675-1680-mhz-band; the President recognized that sharing must be pursued in his October Memorandum on finding a spectrum strategy, Developing a Sustainable Spectrum Strategy for America's Future, 83 Fed. Reg. 54,513, 54,513-14 (Oct. 25, 2018), *available at* https://www.govinfo.gov/content/pkg/FR-2018-10-30/pdf/2018-23839.pdf; and, Congress has required the Commission, in their national spectrum plan, to "examine additional ways, with respect to existing and planned

While some commenters expressed concern over a perceived de-emphasis of exclusive flexible licenses,[15] this view ignores the growing spectrum crunch[16] and discounts the important, growing, and complex spectrum requirements of Federal agencies.[17] Further, this one-way-street view runs counter to the prevailing narrative on spectrum sharing articulated by spectrum stakeholders and policymakers. Examples include:

- Frederick Moorefield, Deputy Chief Information Officer for Command, Control, Communications and Computers and Information Infrastructure Capabilities, Office of the Secretary of Defense, has advocated for changing the paradigm of the spectrum community towards increased collaboration, recognizing exclusive licenses as unsustainable.[18]
- The White House Office of Science and Technology Policy's recent report on spectrum demand identified the prioritization of sharing as a theme among responses from industry to NTIA's request for comments on developing a sustainable spectrum strategy.[19]

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databases or spectrum access systems designed to promote spectrum sharing and access to spectrum for unlicensed or licensed by rule operations." RAY BAUM'S Act, *supra* note 7, at § 618.

[15] These commenters were largely mobile providers, component manufacturers, and commercial wireless trade associations. *See* CTIA, *supra* note 9, at 5 ("Abandoning flexible, exclusive-use licensing and focusing solely on bidirectional sharing would not only break with the tested and successful method, as described above, but would present significant infirmities for spectrum use."); *see also* Motorola Solutions, Inc., Comments Before the Federal Communications Commission, Docket No. 19-128 (May 31, 2019), *available at* https://ecfsapi.fcc.gov/file/1053199084245/Final%20MSI%20Comments%20Bidirectional%20Sharing%20PN%20-%20Docket%2019-128.pdf; T-Mobile, *supra* note 11; TIA, *supra* note 6.

[16] *The Spectrum Crunch*, NIST (June 6, 2016), https://www.nist.gov/topics/advanced-communications/spectrum-crunch.

[17] T-Mobile explains that "providers can also use spectrum on a more limited geographic and/or temporal basis if the sharing parameters are known and predictable" and offers AWS-1, AWS-3, and 3.5 GHz as examples. *Id.* at 3-4. In those examples, previously Federal spectrum was shared with commercial entities. This trend been positive for the development and proliferation of next-generation technologies, but limits the spectrum available for Federal users and inhibits their ability to exploit those technologies.

[18] *DoD CIO Spectrum Policy & International Engagements Brief to NSMA Conference "Spectrum Sharing"*, National Spectrum Management Association (May 15, 2018), https://nsma.org/wp-content/uploads/2018/05/dod-cio-spectrum-policy-international-engagements-brief.pdf.

[19] Office of Science and Technology Policy, *Emerging Technologies and Their Expected Impact on Non-Federal Spectrum Demand*, at 51 (May 2019), https://www.whitehouse.gov/wp-content/uploads/2019/05/Emerging-Technologies-and-Impact-on-Non-Federal-Spectrum-Demand-Report-May-2019.pdf.

- The National Institute of Science and Technology found that "spectrum sharing is necessary because growing demand is crowding the airwaves."[20]
- SpaceX has recognized that for Federal and non-Federal entities to accomplish their various missions, "we all will need to move past historic distrust and leverage instead the advanced technology that enables more sharing."[21]

On the technology that will enable more advanced spectrum sharing regimes, CTIA contends that "there has not yet been a real-world deployment of a successful system with dynamic spectrum usage and sharing" and that "even if SAS-type approaches turn out to be viable, WTB and OET should not consider such methods as the default approach for the sharing of spectrum."[22] This deprecating perspective on sharing solutions misconstrues the importance of creating spectrum policy that enables sharing. As in the cases of the developers of WiFi and operators of Citizens Broadband Radio Service (CBRS) Spectrum Access Systems (SAS), technological innovation requires a positive and unequivocal regulatory framework permitting new use cases. Therefore it is imperative to begin moving towards sharing regimes provided by regulation, so technological innovators can develop the next generation of spectrum tools.

CTIA's take on sharing technology also runs counter to that of many stakeholders and policymakers in the field. Examples include:

- Commissioner Rosenworcel, who called the CBRS sharing regime "a blueprint for the future of spectrum policy."[23]

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[20] *Spectrum Sharing*, NIST (Feb. 4, 2019), https://www.nist.gov/topics/advanced-communications/spectrum-sharing.
[21] SpaceX, Comments Before the National Telecommunications and Information Administration, Docket. No. 181130999-8999-01 (2019), *available at* https://www.ntia.doc.gov/files/ntia/publications/spacex_comments_re_national_spectrum_policy.pdf.
[22] CTIA, *supra* note 9, at 6. TIA is also hesitant at the state of sharing technology. TIA, *supra* note 6, at 6.
[23] Statement of Commissioner Jessica Rosenworcel, *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Further Notice of Proposed Rulemaking, 29 FCC Rcd 4273, *available at* https://docs.fcc.gov/public/attachments/DOC-339104A4.pdf.

- The Senate, having recently introduced the National Defense Authorization Act for Fiscal Year 2020 (NDAA FY20), which includes a section directing the Department of Defense (DoD) and NTIA "to jointly propose an integrated spectrum automation enterprise strategy for [DoD] to address management of electromagnetic spectrum, including both Federal and non-Federal spectrum that is shared by [DoD] or could be used for national security missions in the future, including on a shared basis."[24]
- The President's recent Memorandum on creating a national spectrum strategy advocated for increased automated spectrum sharing.[25]
- Federated Wireless, one of the innovators developing sharing solutions, "shares the Commission's enthusiasm for identifying and enabling innovative mechanisms for making available additional spectrum for sharing between and among varying uses and users."[26]
- Google explained in comments before the NTIA, "[a] sound National Spectrum Strategy should recognize that database systems and other tools for near real-time spectrum management are available today to administer spectrum sharing quickly, efficiently, and reliably."[27]

B. Bidirectional Sharing Protects National Security

[24] National Defense Authorization Act for Fiscal Year 2020, S. 1790, 116th Cong. §214 (2019) (Directing the DoD and NTIA, in consultation with the Commission, "to jointly propose an integrated spectrum automation enterprise strategy for the Department of Defense to address management of electromagnetic spectrum, including both Federal and non-Federal spectrum that is shared by the Department of Defense or could be used for national security missions in the future, including on a shared basis.") [hereinafter NDAA FY20].
[25] Developing a Sustainable Spectrum Strategy for America's Future, *supra* note 14, at 54,514.
[26] Federated Wireless, *supra* note 5, at 1.
[27] Google, LLC, Comments Before the National Telecommunications and Information Administration, Docket No. 18113099-8999-01, at 1 (Jan. 29, 2019). Google also writes "spectrum sharing technologies in the United States, especially in the [CBRS], regulators abroad are codifying policies to promote and maximize the use of dynamic spectrum database technologies." *Id.* at 3.

A variety of innovative sharing techniques, including bidirectional sharing, is a principal part of a successful spectrum strategy. In its comments, Federated Wireless expertly explains that:

> "[b]idirectional sharing will [] enable Federal users to leverage the scale of the commercial device and equipment ecosystem . . . . Where commercial, off-the-shelf equipment meets the requirements of the Federal mission, access to non-Federal spectrum through bidirectional sharing arrangements would allow Federal users to procure such equipment and in doing so realize cost savings compared to the more limited equipment ecosystem available for use in exclusively Federal bands."[28]

T-Mobile writes that "the NTIA Manual of Regulations and Procedures authorizes Federal access to a wide range of non-Federal bands, but generally only for military tactical and training operations."[29] The limited access provided under current regulations does not provide sufficient certainty and flexibility to fully leverage Federal adoption of commercial technologies. Federal users still face barriers to investing in next-generation wireless equipment, which is why an effective, transparent, and codified bidirectional sharing regime is necessary.

It is imperative that Federal users are able to put to use the advanced commercial wireless technologies that drive the modern world. The character of modern conflict, both near-peer and unconventional, demands that the U.S. warfighter have access to the most advanced wireless technologies. The President recognized this important aspect of a spectrum strategy,[30] and the Senate's NDAA FY20 finds that "use of [5G] wireless networks and associated technology will be a foundation for future warfighting applications for the [DoD.]"[31] To meet the needs of the warfighter and these policy

[28] Federated Wireless, *supra* note 5, at 3-4.
[29] T-Mobile, *supra* note 11, at 8.
[30] Developing a Sustainable Spectrum Strategy for America's Future, *supra* note 14, at 54,514.
[31] NDAA FY20, *supra* note 24, at §236(a)(1).

directives, the Commission must expeditiously carry out a study on and implement a bidirectional sharing framework.

Cybersecurity is a critical element of Federal wireless technologies. Motorola expressed concern over cybersecurity, finding that "the risk to cyberattacks is increased as more networks are operated over common cores."[32] This is not necessarily the case, however, as there are models for Federal wireless technology that do not require shared use of common networking core elements, as suggested by Motorola. For example, Oceus Networks offers stand-alone options granting Federal users complete control over all networking elements, from the core to the Radio Access Network to the end user device.[33] Bidirectional sharing empowers Federal users to invest in these technologies, thus promoting cybersecurity.

III. Reliance on Voluntary Commercial Arrangements is not Effective

T-Mobile correctly states that a stable regulatory environment is needed to drive investment for both Federal and non-Federal users of spectrum.[34] For Federal users, this references investment in technologies that protect national security, public safety adaptability, and deployment of advanced technology including voice broadband data, video, and Internet of Things applications. Several commenters advocate for bidirectional sharing strictly where such sharing is voluntary and centered around commercial arrangements.[35] Others advocate for a regulatory framework wherein Federal users are able to buy and sell spectrum as participants in a

[32] Motorola, *supra* note 15, at 3.
[33] *See* Oceus Networks, Multi Purpose Server Platform (MPSP), *available at*, http://www.oceusnetworks.com/wp-content/uploads/2014/12/oceus-fs-MPSP-v9.pdf (last visited Jun. 17, 2019).
[34] T-Mobile, *supra* note 11, at 2.
[35] *See, e.g.*, TIA, *supra* note 6, at 2 ("Any system to permit bi-directional sharing must therefore be completely voluntary."); Federated Wireless, *supra* note 5, at 9 ("Nevertheless, sharing between Federal and non-Federal entities should not be required"); Verizon, *supra* note 12, at 4 ("bidirectional sharing . . . must be predicated on a market-based approach that allows both sides voluntarily to negotiate to meet their respective needs and to appropriately internalize associated costs.").

marketplace.[36] Oceus Networks agrees that commercial arrangements can be a foundation for sharing if technically informed, supported by both parties, and implemented in good-faith towards best use of this national asset. However, a regime wherein one party has the right to exclude would be an ineffective proxy for true bidirectional sharing.

Regulatory certainty means reliable access to spectrum. Leaving terms of Federal access, including location, duration, and power limits, at the discretion of commercial actors greatly increases both the unpredictability and transaction cost of that access. Commercial actors are driven by law to maximize shareholder profit, meaning that national security is not their top priority. To adopt commercial technologies that enhance the U.S. warfighter and protect national security, Federal users need regulators to provide reliable and flexible access to non-Federal spectrum with a bidirectional sharing framework.

Some commenters expressed concern over a perceived devaluing of spectrum post-acquisition as a result of later entry by Federal users.[37] The value of spectrum subject to a bidirectional sharing framework would largely be preserved as Federal activities poised to be conducted pursuant to that framework are mostly in remote areas without significant commercial wireless operations.[38] Moreover, the Commission should consider all interests, especially national security interests, and not just the economic value of spectrum when making spectrum policy.

The proposition that Federal users should become participants in a secondary marketplace would create perverse incentives for Federal spectrum operators, whose mission may not always align with economic benefit.[39] Additionally, allowing wireless providers to

[36] T-Mobile, *supra* note 11, at 7-8.
[37] *See, e.g.*, TIA, *supra* note 6; Verizon, *supra* note 12; CTIA, *supra* note 9.
[38] Federated Wireless, *supra* note 5, at 4.
[39] T-Mobile provides such a framework. T-Mobile, *supra* note 11, at 7-9.

profit from Federal access to remote spectrum would generate revenue from that spectrum, a disincentive to commercial deployment in rural areas. Instead of deploying their spectrum, providers would be able to rely on profits from Federal access, further adding to the difficulty in closing the digital divide.

Regulatory certainty can be provided to both Federal and non-Federal spectrum users if the Commission implements a bidirectional sharing framework incorporating the elements described herein. Other valuable tenants of such a framework provided by other commenters include greater cooperation between Federal and non-Federal spectrum users,[40] increased transparency of spectrum use and needs,[41] and development and adoption of more advanced spectrum management technology and techniques.[42]

Additionally, the Commission should also consider innovative proposals such as those identified by Federated Wireless, namely "'use or share with Federal entities' model, performance benchmarks targeted to the areas in which licensees sharing their spectrum with Federal users have deployed and are operating their own facilities, or sharing-specific safe harbors for construction and other operating requirements."[43] While not a perfect substitute for a full bidirectional sharing framework, these concepts are positive steps towards maximizing the efficiency of spectrum use.

IV. Conclusion

Oceus Networks thanks Congress and the Commission for providing a forum to advocate for the benefits of bidirectional sharing. Bidirectional sharing is a critical aspect of a successful forward-leaning spectrum strategy and has been largely overlooked over the past two decades,

[40] TIA, *supra* note 6.
[41] Motorola, *supra* note 15, at 3; CTIA, *supra* note 9, at 12.
[42] Federated Wireless, *supra* note 5, at 5; TIA, *supra* note 6, at 8.
[43] Federated Wireless, *supra* note 5 at 6.

which have seen numerous spectrum reallocations to commercial players and reliance on exclusive rights-based auction spectrum policy. Oceus Networks urges the Commission to rapidly move toward implementing a framework that guarantees Federal access to non-Federal spectrum in the interest of national security and more advanced Federal spectrum use. This framework cannot depend solely on the voluntary participation of non-Federal spectrum users, which would leave Federal operations at the discretion of commercial entities. Oceus Networks looks forward to continued national progress on bidirectional sharing, and urges the Commission to rapidly implement this necessary aspect of a successful spectrum strategy.